Naval Education and Training Command

NAVEDTRA 82418
September 1996
0503-LP-480-3200

Nonresident Training Course (NRTC)

Electronics Technician

Volume 8—Support Systems

Only one answer sheet is included in the NRTC. Reproduce the required number of sheets you need or get answer sheets from your ESO or designated officer.

Although the words “he,” “him,” and “his” are used sparingly in this manual to enhance communication, they are not intended to be gender driven nor to affront or discriminate against anyone rcading this text.

ELECTRONICS TECHNICIAN–VOLUME 8
SUPPORT SYSTEMS
NAVEDTRA 82418

Prepared by the Naval Education and Training Program Management Support Activity (NETPMSA), Pensacola, Florida

Congratulations! By enrolling in this course, you have demonstrated a desire to improve yourself and the Navy. Remember, however, this self-study course is only one part of the total Navy training program. Practical experience, schools, selected reading, and your desire to succeed are also necessary to successfully round out a fully meaningful training program. You have taken an important step in self-improvement. Keep up the good work.

HOW TO COMPLETE THIS COURSE SUCCESSFULLY

ERRATA: If an errata comes with this course, make all indicated changes or corrections before you start any assignment. Do not change or correct the associated text or assignments in any other way.

TEXTBOOK ASSIGNMENTS: The text for this course is Electronics Technician–Vohlme 8, *Support Systems,* NAVEDTRA 12418. The text pages that you are to study are listed at the beginning of each assistant. Study these pages carefully before attempting to answer the questions in the course. Pay close attention to tables and illustrations because they contain information that will help you understand the text. Read the learning objectives provided at the beginning of each chapter or topic in the text and/or preceding each set of questions in the course. Learning objectives state what you should be able to do after studying the material. Answering the questions correctly helps you accomplish the objectives.

SELECTING YOUR ANSWERS: After studying the associated text, you should be ready to answer the questions in the assignment. Read each question carefully, then select the BEST answer. Be sure to select your answer from the subject matter in the text. You may refer freely to the text and seek advice and information from others on problems that may arise in the course. However, the answers must be the result of your own work and decisions. You are prohibited from referring to or copying the answers of others and from giving answers to anyone else taking the same course. Failure to follow these rules can result in suspension from the course and disciplinary action.

ANSWER SHEETS: You must use answer sheets designed for this course (NETPMSA Form 1430/5, Stock Ordering Number 0502-LP-216-0100). Use the answer sheets provided by Educational Services Officer (ESO), or you may reproduce the one in the back of this course booklet.

SUBMITTING COMPLETED ANSWER SHEETS: As a minimum, you should complete at least one assignment per month. Failure to meet this requirement could result in disenrollment from the course. As you complete each assignment, submit the completed answer sheet to your ESO for grading. You may submit more than one answer sheet at a time.

GRADING: Your ESO will grade each answer sheet and notify you of any incorrect answers. The passing score for each assignment is 3.2. If you receive less than 3.2 on any assignment, your ESO will list the questions you answered incorrectly and give you an answer sheet marked “RESUBMIT.” You must redo the assignment and complete the RESUBMIT answer sheet. The maximum score you can receive for a resubmitted assignment is 3.2.

COURSE COMPLETION: After you have submitted all the answer sheets and have earned at least 3.2 on each assignment, your command should give you credit for this course by making the appropriate entry in your service record.

NAVAL RESERVE RETIREMENT CREDIT: If you are a member of the Naval Reserve, you will receive retirement points if you are authorized to receive them under current directives governing retirement of Naval Reserve personnel. For Naval Reserve retirement, this course is evaluated at 3 points. (Refer to BUPERSINST 1001.39 for more information about retirement points.)

STUDENT QUESTIONS: If you have questions concerning the administration of this course, consult your ESO. If you have questions on course content, you may contact NETPMSA at:

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COURSE OBJECTIVES: In completing this nonresident training course, you should be able to: describe the different liquid cooling systems, dry air systems, ac power distribution systems, ship's input systems in terms of their different types, component parts, configuration, operation, and maintenance.

Naval courses may include several types of questions--multiple-choice, true-false, matching, etc. The questions are not grouped by type but by subject matter. They are presented in the same general sequence as the textbook material upon which they are based. This presentation is designed to preserve continuity of thought, permitting step-by-step development of ideas. Not all courses use all of the types of questions available. You can readily identify the type of each question, and the action required, by reviewing of the samples given below.

MULTIPLE-CHOICE QUESTIONS

Each question contains several alternative answers, one of which is the best answer to the question. Select the best alternative, and blacken the appropriate box on the answer sheet.

SAMPLE

s-1. The first U.S. Navy nuclear-powered vessel was what type of ship?

1. Carrier
2. Submarine
3. Destroyer
4. Cruiser

Indicate in this way on your answer sheet:

	1	2	3	4	
	T	F			
s-1	☐	■	☐	☐	___

TRUE-FALSE QUESTIONS

Mark each statement true or false as indicated below. If any part of the statement is false, the entire statement is false. Make your decision, and blacken the appropriate box on the answer sheet.

SAMPLE

s-2. Shock will never be serious enough to cause death.

1. True
2. False

Indicate in this way on your answer sheet:

	1	2	3	4	
	T	F			
s-2	☐	■	☐	☐	___

MATCHING QUESTIONS

Each set of questions consists of two columns, each listing words, phrases or sentences. Your task is to select the item in column B which is the best match for the item in column A. Items in column B may be used once, more than once, or not at all. Specific instructions are given with each set of questions. Select the numbers identifying the answers and blacken the appropriate boxes on your answer sheet.

SAMPLE

In answering questions s-3 through s-6, SELECT from column B the department where the shipboard officer in column A functions. Responses may be used once, more than once, or not at all.

A. OFFICER	B. DEPARTMENT
s-3. Damage Control Assistant	1. Operations Department
s-4. CIC Officer	2. Engineering Department
s-5. Disbursing Officer	3. Supply Department
s-6. Communications Officer	4. Navigation Department

Indicate in this way on your answer sheet:

	1	2	3	4	
	T	F			
s-3	☐	■	☐	☐	___
s-4	■	☐	☐	☐	___
s-5	☐	☐	■	☐	___
s-6	■	☐	☐	☐	___

ASSIGNMENT 1

Textbook Assignment: "Liquid Cooling Systems," chapter 1, pages 1-1 through 1-24. "Dry Air Systems," chapter 2, pages 2-1 through 2-9.

Learning objective: Identify and describe the liquid cooling system components and their operation.

1-1. Three of the four methods of cooling are forced-air, air-to-air, air-to-liquid. What is the fourth?

1. Circulation
2. Convention
3. Conversion
4. Convection

1-2. When utilizing forced-air cooling, an air filter must be provided at the air outlet to remove dust and dirt from the exhaust air.

1. True
2. False

1-3. Heat is removed from the air passing by the heat producing source in an air-to-air cooling system by forcing it through what component?

1. Blower
2. RF filter
3. Heat exchanger
4. Fins

1-4. Efficiency is increased in an air-to-liquid cooling system by the use of what system component?

1. Liquid heat exchangers
2. Dual blower motors
3. Larger supply lines
4. Duplex strainers

1-5. What number of basic cooling systems make up a typical liquid cooling system?

1. One
2. Two
3. Three
4. Four

1-6. The secondary cooling system transfers the heat load from the electronic equipment to the primary system.

1. True
2. False

1-7. The Navy uses what number of basic configurations of liquid cooling systems?

1. One
2. Two
3. Three
4. Four

1-8. Which of the following water resources is/are used for primary cooling?

1. Seawater only
2. Chilled water only
3. Seawater and chilled water
4. Potable water and seawater

1-9. The cooling water for the primary cooling system is either seawater or chilled water. The seawater is from the sea and the chilled water is from what source?

1. The liquid cooling system
2. The ship's air conditioning plant
3. The ship's firemain system
4. The reefer deck supply system

1-10. When temperature range is considered to be critical, what type of cooling system would most likely satisfy this need?

1. Type I
2. Type II
3. Type III
4. Type IV

1-11. What type of liquid cooling system can satisfactorily be operated when seawater temperatures reach 95°F?

1. Type I
2. Type II
3. Type III
4. Type IV

1-12. In a primary cooling system, flow regulator may be known by what other term?

1. Expansion tank
2. Demineralizer
3. Gate valve
4. Orifice plate

1-13. Open looped seawater systems are also called one-pass because the seawater flows through the system only once.

1. True
2. False

1-14. Secondary cooling systems are which of the following types?

1. Open-loop only
2. Closed-loop only
3. Both 1 and 2 above
4. One-pass

1-15. Type I cooling systems employ what type of configuration?

1. Two SW/DW heat exchangers of the same design
2. Two CW/DW heat exchangers of the same design
3. One CW/DW heat exchanger and one standby CW/DW heat exchanger
4. One SW/DW heat exchanger and one standby CW/DW heat exchanger

1-16. An expansion tank is installed in what system to compensate for changes in coolant volume?

1. The seawater
2. The potable water
3. The distilled water
4. The chilled water

1-17. What term best describes a expansion tank that is located above the highest point in the secondary system and vented to the atmosphere?

1. Pressure tank
2. Compression tank
3. Freefall tank
4. Gravity tank

1-18. What term best describes an expansion tank that requires an air charge on the tank and is located below the highest point in the secondary cooling system?

1. Pressure tank
2. Compression tank
3. Freefall tank
4. Gravity tank

1-19. What definition best describes the word submicron?

1. Less than one millionth of a meter
2. Equal to one millionth of a meter
3. Greater than one millionth of a meter
4. Equal to one meter

1-20. The Type II cooling system employs what configuration?

1. Two SW/DW heat exchangers of the same design
2. Two CW/DW heat exchangers of the same design
3. One CW/DW heat exchanger and one standby CW/DW heat exchanger
4. One SW/DW heat exchanger and one standby CW/DW heat exchanger

1-21. The Type III cooling system employs what configuration?

1. Two SW/DW heat exchangers of the same design
2. Two CW/DW heat exchangers of the same design
3. One CW/DW heat exchanger and one standby CW/DW heat exchanger
4. One SW/DW heat exchanger and one standby CW/DW heat exchanger

1-22. In a Type III cooling system, the two-way temperature regulating valve is used instead of a three-way valve to regulate the temperature in what system component(s)?

1. The primary loop
2. The secondary loop
3. The heat exchangers
4. The circulating pumps

IN ANSWERING QUESTIONS 1-23 THROUGH 1-29, SELECT FROM THE FOLLOWING LIST THE DEFINITION FOR THE TERM USED AS THE QUESTION.

A. It is constructed to be shell-type and tube-type in which the secondary coolant flows through the shell, while the primary coolant flows through the tubes.

B. It maintains a positive pressure on the circulating pump inlet, compensates for changes in the coolant volume and it vents air from the system.

C. It is used to circulate secondary distilled water.

D. It regulates the amount of cooling water flowing through or bypassing a heat exchanger to maintain a desired temperature of distilled water going to the electronic equipment.

E. It is used to provide a constant flow of coolant through the system.

F. It maintains the secondary cooling system's purity.

G. It is used in the seawater cooling system to remove debris and sea life, which could clog the pressure and flow control devices.

1-23. Heat exchanger.

1. A
2. B
3. C
4. D

1-24. Flow regulators.

1. E
2. F
3. G
4. A

1-25. Expansion tank.

1. B
2. C
3. D
4. E

1-26. Seawater strainer.

1. F
2. G
3. A
4. B

1-27. Temperature regulating valve.

1. C
2. D
3. E
4. F

1-28. Circulating pump.

1. G
2. A
3. B
4. C

1-29. Demineralize.

1. D
2. E
3. F
4. G

1-30. An oxygen analyzer is used to measure the amount of dissolved oxygen in the liquid cooling system. The presence of oxygen causes oxidation within the cooling system.

1. True
2. False

1-31. When inspecting a telltale drain, you discover that it is leaking. What failure does it indicate?

1. The seawater strainer
2. The bypass fins
3. The tube joint
4. The circulating pump

1-32. The overall effectiveness of the heat exchanger is determined by comparing the primary inlet temperature to its outlet pressure. The result of this comparison is best described by what term?

1. Temperature variable
2. Temperature difference
3. Temperature gradient
4. Temperature coefficient

1-33. What is the symbol for temperature gradient?

1. #T
2. %T
3. ΔT
4. $\pm$T

1-34. The device that is inserted in the heat exchanger's water box to concentrate electrolytic action to it vice to the metal of the heat exchanger's tubes is made of what material (s)?

1. Zinc cathode
2. Zincs only
3. Zinc anode only
4. Both 2 and 3 above

1-35. Who is the best qualified person on board to determine the overall condition of the cooling system?

1. Engineering officer
2. Electronics material officer
3. System's test officer
4. Ship's maintenance technician

1-36. The expansion tank sight glass should normally read in what range?

1. 1/4 to 1/2 full
2. 1/3 to 2/3 full
3. 1/2 to 3/4 full
4. 2/3 to 4/5 full

1-37. The low-level alarm switch is usually set at 20 percent of tank capacity. The alarm will initially sound when the distilled water level reaches which of the following levels?

1. 5 percent of full
2. 10 percent of full
3. 15 percent of full
4. 20 percent of full

1-38. What term best describes the word makeup water?

1. Distilled water
2. Seawater
3. Potable water
4. Chilled water

1-39. When, if ever, may potable water be used in electronic cooling systems?

1. After chloride is added
2. Only as makeup water
3. As a replacement for chilled water
4. NEVER

1-40. What is the maximum permissible chloride that may be used in cooling system water?

1. 6.5 epm
2. 0.65 epm
3. 0.065 epm
4. 0.0065 epm

1-41. What is an indication that the duplex strainer is clogged?

1. The pressure reading will be 5 to 10 psi below a clean basket reading
2. The pressure reading will be 5 to 10 psi above the clean basket reading
3. The water temperature will be 5 to 10 degree below normal
4. The water temperature will be 5 to 10 degree above normal

1-42. If the pressure drop is less than that of a clean basket reading, the basket may be missing.

1. True
2. False

1-43. The three-way temperature regulating valve is used where seawater is the primary cooling medium, and the two-way valve is used where chilled water is the primary cooling medium.

1. True
2. False

1-44. The basic operation of both the two-way temperature regulating valve is the same as the three-way temperature regulating valve except that the two-way valve has a manual override feature.

1. True
2. False

1-45. Temperature regulating valve corrective maintenance consists only of visual checks for leaks and corrosion.

1. True
2. False

1-46. Which of the following devices is used to regulate flow in a seawater cooling system?

1. The gate valve
2. The globe valve
3. The orifice plate
4. The relief valve

1-47. Which of the following flow regulators is used to regulate flow in the chilled water system?

1. The globe valve
2. The orifice plate
3. The variable orifice
4. The equipment-flow regulator

1-48. Which of the following devices would be used to protect a cooling system from over pressurization?

1. The variable orifice
2. The pressure regulator
3. The equipment-flow regulator
4. The relief valve

1-49. What is the function of a typical low-flow switch?

1. To indicate low coolant flow
2. To indicate excessive coolant flow
3. To redirect coolant flow to another load
4. To control coolant flow through the heat exchangers

1-50. In a venturi-type flowmeter, the flow rate is measured by what process?

1. The pressure differential between the two taps
2. The decreased coolant velocity
3. The turbulence of the coolant
4. The diameter of the throat

1-51. Which of the following flowmeters allows visual inspection of the coolant for entrained air?

1. The orifice-type
2. The venturi-type
3. The purity-type
4. The rotameter-type

1-52. Operating a circulating pump with insufficient coolant flow could cause which of the following malfunctions?

1. The overheating of the pump only
2. The seizure of the pump only
3. Both 1 and 2 above
4. The reduction of outlet pressure

1-53. What percent of the coolant flows through the demineralizer in one hour?

1. 100%
2. 50%
3. 20%
4. 5%

1-54. Which of the following demineralizer components is used to remove small particles from the coolant?

1. The mixed-bed cartridge
2. The organic cartridge
3. The oxygen removal cartridge
4. The submicron filter

1-55. Which of the following contaminations is least likely to occur in a distilled water and ethylene glycol coolant system?

1. Dissolved oxygen
2. Chlorine
3. Oxidized metal
4. Bacterial

1-56. Demineralize performance and coolant purity is monitored by measuring what property of the coolant?

1. Temperature compensation
2. Conductivity
3. Pressure differential
4. Resistivity

1-57. Scheduled maintenance of a demineralizer consists primarily of performing what preventive action?

1. Adjusting the coolant flow through the system
2. Replacing the purity monitors
3. Replacing the filters and cartridges
4. Calibrating the purity monitors

1-58. Which of the following contaminates could be considered a source of contamination for an oxygen analyzer sensor?

1. Electrolyte
2. Oil from your fingers
3. Direct sunlight
4. Fluorescent lighting

1-59. What position on an alarm switchboard is used for alarm acknowledgement?

1. Normal
2. Standby
3. cutout
4. Test

1-60. What position on an alarm switchboard is used to simulate an alarm position?

1. Normal
2. Standby
3. Cutout
4. Test

1-61. What is the first step in isolating the extent of waveguide flooding?

1. Secure the cooling system
2. Estimate the amount of coolant lost
3. Secure the dry air system
4. Open the lowest point in the waveguide

Learning Objective: Describe the dry air system components and their operation.

1-62. Dew point is best defined by which of the following statements?

1. Temperature at which water vapor begins to deposit as a liquid
2. Temperature at which water vapor starts to condensate
3. Temperature of precipitation
4. Temperature of the water particles in the air

1-63. Compressing air has what effect, if any, on relative humidity?

1. It will increase
2. It will decrease
3. It will vary inversely with the pressure
4. None

IN ANSWERING QUESTIONS 1-64 THROUGH 1-67, SELECT FROM THE LIST BELOW THE DEFINITION FOR THE TERM INDICATED IN THE QUESTION.

A. Uses a combination of refrigeration and desiccant to dry the air

B. Compresses the air

C. Uses adsorption ONLY to dry the air

D. Uses freezing ONLY to dry the air

1-64. Type I dehydrator.

1. A
2. B
3. C
4. D

1-65. Type II dehydrator.

1. A
2. B
3. C
4. D

1-66. Type III dehydrator.

1. A
2. B
3. C
4. D

1-67. Air compressor.

1. A
2. B
3. C
4. D

1-68. What is the normal mode of operation of an equipment air dryer?

1. Start-up
2. Fluid separation
3. Automatic
4. By-pass

1-69. Oil vapor is removed from the compressed air by which of the following methods?

1. By absorption
2. By adsorption
3. By ionization
4. By fluid separation

IN ANSWERING QUESTIONS 1-70 THROUGH 1-75, SELECT FROM THE AIR DRYER COMPONENTS LISTED BELOW AND MATCH THEIR COMPONENTS FUNCTION USED IN THE QUESTION.

A. Fluid separator

B. Telltale oil filter

C. Pressure regulator

D. Dehydrator

1-70. It contains a desiccant chambers to dry the air.

1. A
2. B
3. C
4. D

1-71. It controls inlet air to the dehydrator.

1. A
2. B
3. C
4. D

1-72. It uses centrifugal force to extract droplets of liquid.

1. A
2. B
3. C
4. D

1-73. It uses absorption to remove oil vapor.

1. A
2. B
3. C
4. D

1-74. It provides the input to the pressure regulator.

1. A
2. B
3. C
4. D

1-75. It discharges oil and water through a muffler.

1. A
2. B
3. C
4. D

ASSIGNMENT 2

Textbook Assignment: "AC Power Distribution System," chapter 3, pages 3-1 through 3-18; "Ship's Input Systems," chapter 4, pages 4-1 through 4-9; It Information Transfer Systems, "chapter 5, pages 5–1 through 5-16.

Learning Objective: Identify the fundamentals of the ship's service power distribution systems.

2-1. Which of the following systems comprises the shipboard power distribution system?

1. The casualty power system only
2. The emergency power system only
3. The ship's service system only
4. All of the above

2-2. What is the function of the switchboard bus ties?

1. To permit switchboards to be cross connected and to allow paralleling of generators
2. To allow power distribution directly from the generator to the load
3. To allow the generators to operate in series
4. To feed power to the dc generator

2–3. On small ships, centrally locating switchboards (with respect to the load) and feeding them directly from the generators have which of the following advantages?

1. It simplifies the installation
2. It reduces size and weight requirements
3. It reduces equipment requirements
4. Each of the above

2-4. Circuit information plates are located on which of the following locations?

1. The bulkhead near the fuse boxes
2. The distribution panels and bus transfer equipment
3. The electric cables
4. All equipment controllers

2-5. Why is the phase sequence important to the power distribution system aboard ship?

1. An improper phase will cause voltage fluctuations
2. The phase sequence determines the amount of current available
3. The phase sequence determines the direction of rotation of three-phase motors
4. Distribution panel bus bars are label alphabetically from top to bottom

2-6. What service is provided by bus transfer equipment?

1. It provides two sources of power to vital ship's equipment
2. It provides short-circuit protection to the ship's service generators
3. It provides overload protection to ship's circuit breakers
4. It provides protection from paralleling two switchboards that are out of phase

2-7. If NORMAL power were to fail supplying the HF transmitter, ALTERNATE power would be restored by the use of which of the following components?

1. Manual bus transfer (MBT) only
2. Automatic bus transfer (ABT) only
3. Either 1 or 2 above
4. Communications switchboard

2-8. Aboard ships, switchgear groups are physically separated as much as practical to achieve what objective?

1. Easy access for maintenance
2. Reduce accidental loss of power
3. Afford greater protection from battle damage
4. Prevent unnecessary cost and weight during ship's construction

2-9. Which of the following actions is NOT a function provided by switchboards aboard ships?

1. Automatic shifting of power to alternate sources if normal power is lost
2. Distribution of three-phase, 450 volt power
3. Circuit protection
4. Control, monitoring, protection of the ship's service generators

2-10. What is the purpose of disconnect links?

1. They provide a convenient means of load testing
2. They provide isolation from one switchboard while repairs are being conducted on another
3. They provide a means of securing switchboard power in case of fire
4. They provide over current protection to the main bus

2-11. The output of all ac generators is developed in what part of the generator?

1. The field windings
2. The stator windings
3. The rotor windings
4. The armature windings

2-12. What are the two major assemblies of an ac generator?

1. Stator and rotor
2. Stator and armature
3. Armature and rotor
4. Armature and fields

2-13. Three-phase generators have single-phase windings located what number of degrees out of phase from the other windings?

1. 90° out of phase with the other two windings
2. 120° out of phase with the other two windings
3. 180° out of phase with the other two windings
4. 360° out of phase with the other two windings

2-14. The three-phase, four-wire, STAR connected power distribution system is also know by what other term?

1. Delta connected
2. Ana connected
3. Wye connected
4. Jal connected

2-15. In a transformer, electrical energy is transferred from one circuit to another through which of the following actions?

1. Hysteresis coupling
2. Electrostatic radiation
3. Electromagnetic induction
4. Inductive reactance

2-16. Energy in a transformer is always transferred without a change in frequency, but you can expect a change in which of the following attributes?

1. Amplitude and time
2. Inductance and current
3. Current and voltage
4. Voltage and inductance

2-17. Which transformer winding is designated as the primary winding?

1. The one that receives energy from an ac source
2. The one with the highest voltage
3. The one with the lowest voltage
4. The one that delivers energy to the load

2-18. What are the two principle types of transformers?

1. Core and shell
2. primary and secondary
3. Single-phase and polyphase
4. Ac and dc

2-19. Most power supply transformers are designed to operate at frequencies of

1. 50 to 60 Hz
2. 60 to 120 Hz
3. 120 to 220 Hz
4. 220 to 400 Hz

2-20. Transformers of higher frequencies are of smaller design and permit savings of weight and use of associated equipments.

1. True
2. False

2-21. The use of varnish to insulate adjacent laminations in a transformer core helps minimize which of the following factors?

1. Heat dissipation to the enclosure
2. Hysteresis losses
3. Magnetization of the secondary winding
4. Magnetization of the primary winding

2-22. In transformer lead markings, the high voltage leads are marked H1, H2, H3, etc. The letter signifies high voltage, what does the number indicate?

1. Numerical position from the transformer's core
2. Shows total number of high voltage leads
3. The higher the number, the higher the voltage
4. Used for identification and tracing purposes

2-23. Transformer secondary lead markings are identified by which of the following letters?

1. R
2. H
3. X
4. S

2-24. Which of the following types of equipment are used to supply 400 Hertz power to a transformer?

1. Motor-generator units
2. Static converters
3. Both 1 and 2 above
4. Steam turbines

2-25. What is the primary purpose of the casualty power system?

1. To make temporary connections to vital circuits
2. To make permanent connections to vital equipment
3. To make permanent connections to vital circuits
4. To make temporary connections to ac generators

2-26. Casualty power bulkhead terminals are permanently installed on opposite sides of bulkheads for what reason?

1. To provide casualty power to selected equipment
2. To transfer power through decks without loss of watertight integrity
3. To transfer power through decks 180° out of phase with other bulkhead terminals
4. To transfer power through decks 90° out of phase with other bulkhead terminals

2-27. When a generator is used exclusively for casualty power, you must perform which of the following actions?

1. Open the generator circuit breaker
2. Open the generator disconnect links
3. Remove all normal circuits from the switchboard that the generator is feeding
4. Transfer all bus transfer switches to emergency power

2-28. A portable cable used to rig ac casualty power can carry (a) what maximum amount of current and (b) for what maximum number of hours?

1. (a) 93 A (b) 4 hours
2. (a) 93 A (b) 40 hours
3. (a) 200 A (b) 40 hours
4. (a) 200 A (b) 4 hours

2-29. Shore power connections aboard ship may be used to supply power to another ship alongside.

1. True
2. False

2-30. When testing shore power cables, you should use which of following grounds as a shore ground resistance?

1. The ship's hull
2. A 16 AWG or larger wire with one side cropped over the side of the ship
3. The enclosure that houses the shore-power terminals or receptacles
4. Phase A of the shore-power cable

2-31. What is the key component of the phase-sequence indicator?

1. The three-phase induction motor
2. The saturable reactor
3. The ion drive clutch assembly
4. The digital display

Learning Objective: Describe and identify components of various gyrocompass systems.

2-32. The gyrocompass system provides a means of determining ownship's

1. heading, roll, and pitch
2. speed, distance, and bearing
3. heading, speed, and distance
4. speed, roll, and pitch

2-33. Gyrocompass systems are identified by the mark, (Mk), and modification (Mod) system. The MK number designates a

1. major development of a compass
2. major modification of a compass
3. a change to a major development of a compass
4. a major modification to a change of a compass

2-34. The Mk 19 gyrocompass consists of four major components: the control cabinet, the failure annunciator, the master compass and the

1. power supply
2. slave compass
3. indicator
4. power converter

2-35. Thirty-six speed indicators are used instead of single-speed indicators when least precise readings are required.

1. True
2. False

2-36. The Mk 23 gyrocompass consists of what major units?

1. The master unit and control cabinet only
2. The compass failure annunciator, alarm bell only
3. The alarm control and speed unit only
4. All of the above

2-37. What are the three major components that make up the Mk 27 gyrocompass?

1. The master unit, control cabinet, and power converter
2. The master unit, switching unit, and power converter
3. The master unit, slave unit, and control cabinet
4. The master unit, speed compensator, and switching unit

2-38. The AN/WSN-2 stabilized gyrocompass consists of five major components: the inertial measuring unit, the control power supply, the amplifier synchro signal, the battery set, and what other unit?

1. The master unit
2. The slave unit
3. The speed compensating unit
4. The control indicating unit

2-39. Generally each radar system will have its own synchro signal amplifier.

1. True
2. False

2-40. Synchro signal converters can convert 60 Hz to 400 Hz and 400 Hz to 60 Hz. What other conversions can it make?

1. Relative bearing to true bearing
2. Synchro speed
3. Synchro frequency
4. All of the above

2-41. What number of the AN/WSN-5 inertial navigation sets are generally installed on board?

1. Four
2. Three
3. Two
4. One

2-42. The underwater log system measures and indicates what attributes?

1. Speed of the ship in knots and distance traveled through the water in statue miles
2. Speed of the ship in miles per hour and distance traveled through the water in knots
3. Speed of the ship in knots and distance traveled through the water in nautical miles
4. Speed of the ship in miles per hour and distance traveled through the water in miles per hour

2-43. Which of the following equipments are types of underwater log systems?

1. Electro-static and Doppler
2. Electro-static and phased-array
3. Electromagnetic and phased-array
4. Electromagnetic and Doppler

2-44. The sea valve, provides support for the rodmeter, and also provides a seal to the hull when the rodmeter is removed. What other function, if any, does the sea valve provide?

1. It provides the data for its transmission to the underwater log system
2. It monitors the flow of data in the underwater log system
3. It provides conversion of input data to the underwater log system
4. None

2-45. What is another term for the name rodmeter?

1. Foot
2. Boot
3. Knife
4. Sword

2-46. What are two types of digital switchboards?

1. Automatically controlled and manually controlled
2. Analog controlled and digitally controlled
3. Manually controlled and remotely controlled
4. Automatically controlled and remotely controlled

2-47. On digital switchboards, what is the minimum number of manual switches required for each I/O device computer channel?

1. One
2. Two
3. Three
4. Four

2-48. Control signals used to select the desired switch configuration are generated by which of the following devices?

1. DFCS only
2. CSCP only
3. Both 1 and 2 above
4. The DSCS only

2-49. Each DFCS section contains what maximum amount of switch panels?

1. 12
2. 18
3. 24
4. 32

2-50. The linear movement switches are usually positioned by control signals from what source?

1. DSCS
2. DFCS
3. CSMP
4. CSCP

2-51. The power distribution panel assembly contains six indicators mounted on the front of the panel to indicate the presence of power when applied to the panel.

1. True
2. False

2-52. Linear switches perform either three-position or five-position switching functions. The three-position switches are used for

1. NORMAL/ALTERNATE switching with an OFF position
2. NORMAL/ALTERNATE switching with an ON position
3. REMOTE/MANUAL with an OFF position
4. REMOTE/MANUAL with an ON position

2-53. When a linear switch is in the remote position, what piece of equipment has control of the switch position?

1. DFCS
2. CSCP
3. The computer
4. Remote equipment

2-54. The switch control and potentiometer transformer ACO assembly is used to provide voltages for bench testing which of the following DFCS panels?

1. Relay tester assemblies
2. Power distribution panels
3. Linear movement switches
4. All of the above

2-55. Four colors are used for PBI indicators on the CSCP: white, red, green and yellow. What indication is provided by yellow?

1. Switch is the ON position
2. Switch is in the OFF position
3. Switch is in the ALTERNATE position
4. A logic error exists in the PBI circuitry

2-56. The HOLD PBIs are used to indicate what function?

1. Control transfer initiated
2. Control transfer complete
3. Control transfer refusal
4. Each of the above

2-57. Ship’s wire marking codes provide what information?

1. Circuit designation, function number and assigned wire number
2. Function number, circuit designation and assigned wire number
3. Assigned wire number, circuit designation and function number
4. Function number, assigned wire number and circuit designation

2-58. A ship's wire has a plastic sleeve with the following markings on it, 12 PD 1952. What does the 1952 indicate?

1. The year the cable was manufactured
2. The circuit designation
3. The function number
4. Assigned wire number

2-59. What two types of connectors does the CSCP use?

1. 10-pin and 85-pin
2. P and J
3. Type A and Type B
4. Amphenol and Portsmouth

2-60. Reference designations of JA, JB, JN, and JP are used with what type connectors?

1. P-connectors
2. Type B connectors
3. 10-pin connectors
4. Amphenol connectors

2-61. Each analog switchboard section contains what maximum number of panels?

1. 6
2. 12
3. 24
4. 36

IN ANSWERING QUESTIONS 2-62 THROUGH 2-66, SELECT FROM THE FOLLOWING LIST THE ANALOG SWITCHBOARD PANEL THAT PERFORMS THE FUNCTION LISTED IN EACH QUESTION.

A. Indicator panel assembly

B. Fuse panel assembly

C. Meter panel assembly

D. Flasher panel assembly

E. Snap switch panel assembly

2-62. Monitors ac and dc power buses.

1. A
2. B
3. C
4. D

2-63. Contains overflow fuses for associated switch panels.

1. A
2. B
3. C
4. D

2-64. Provides a visual indication of the active power being supplied to the switchboard.

1. A
2. B
3. C
4. D

2-65. Indicates a warning or emergency condition.

1. B
2. C
3. D
4. E

2-66. Provides manual control of switchboard power buses.

1. B
2. C
3. D
4. E

2-67. Manually operated JR switch panel assemblies and remotely operated JR switch panel assemblies provide the same function with the exception that one can be operated remotely.

1. True
2. False

2-68. When a control signal is fed back to the KCMX as a status signal input by the switchboard for test purposes, the switchboard is in which of the following configurations?

1. NORMAL
2. OFF
3. REMOTE
4. EAT

2-69. The SB-4229/SP switchboard replaces which of the following switchboards?

1. SB-440
2. SB-1109
3. SB-1505
4. Each of the above

2-70. The SB-4229/SP can accept (a) how many radar set inputs and (b) distribute them to what number of radar indicators?

1. (a) Five (b) four
2. (a) Five (b) six
3. (a) Six (b) nine
4. (a) Nine (b) sixteen

2-71. The signal data converter (SDV) conditions and multiplexes its various data inputs into a single analog data stream.

1. True
2. False

2-72. All replaceable modules, assemblies and printed circuit boards with a high-cost value are designed and constructed to be repairable to component level with the exception of which of the following components?

1. High-voltage power supplies
2. CRT back plane wiring harness
3. Both 1 and 2 above
4. Back plane wiring harness

2-73. On the SB-988/SRT Transmitter Transfer Switchboard, each knob has 8 positions. What position removes the remote from the system?

1. 8
2. 7
3. 6
4. 5

2-74. The SB-973/SRT receiver switchboard allows the audio outputs of the receivers to be

1. heterodyned and transferred to remote stations
2. multiplexed and transferred to remote stations
3. transferred to remote stations
4. amplified and transferred to remote stations

2-75. The SB-973/SRT switchboard contains 10 switches that have what number of positions?

1. Eight
2. Seven
3. Six
4. Five

*U.S. Government Printing Office: 1996 - 532-161/40104

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